WHAT IS CLAIMED IS:

1. A manufacturing method of a silicon wafer, in which a silicon wafer that has been sliced from a silicon single crystal is heat-treated in an oxidizing atmosphere, wherein

assuming that a temperature at which said heat treatment is carried out in said oxidizing atmosphere is denoted as T(℃) and an interstitial oxygen concentration is denoted as [Oi] (atoms/cm^3), said manufacturing method of the silicon wafer characterized in that a relation between said temperature T and said interstitial oxygen concentration [Oi] satisfies the following formula:

$[Oi] \leqq 2.123 \times 10^{21} \exp(-1.035/k(T+273))$,

where, said interstitial oxygen concentration is a value measured in accordance with FT-IR method (ASTM F-121, 1979) and the k is the Boltzmann's constant, 8.617×10^{-5}(eV/K).

2. A manufacturing method of a silicon wafer in accordance with claim 1, in which a single crystal doped with phosphorus by a neutron irradiation is used as said silicon single crystal.

3. A manufacturing method of a silicon wafer in accordance with claim 1 or 2, in which a single crystal doped with nitrogen by a concentration of 2×10^{13} atoms/cm^3 or more is used as said silicon single crystal.

4. A manufacturing method of a silicon wafer in accordance with any one of claim 1 through 3, in which a single crystal doped with carbon by a concentration of 5×10^{16} atoms/cm^3 or more is used as said silicon single crystal.

5. A manufacturing method of a silicon wafer in accordance with

any one of claim 1 through 4, in which the silicon wafer is mirror-polished after said heat treatment in said oxidizing atmosphere.

6. A manufacturing method of a SOI wafer, in which a SOI wafer is manufactured by using said silicon wafer manufactured by said method as defined in claim 5 for an active layer side wafer.

7. A manufacturing method of a SOI wafer, in which a buried oxide film is formed by applying a heat treatment to an active layer side silicon wafer in an oxidizing atmosphere, and said active layer side silicon wafer is then bonded to a supporting side wafer with said buried oxide layer interposed therebetween thus to manufacture a bonded SOI wafer, wherein

assuming that a temperature at which said heat treatment is applied to said active layer side silicon wafer in said oxidizing atmosphere is denoted as T(℃) and an interstitial oxygen concentration of said active layer side silicon wafer is denoted as [Oi] (atoms/cm^3), said manufacturing method of the SOI wafer characterized in that a relation between said heat treatment temperature T and said interstitial oxygen concentration [Oi] of said active layer side silicon wafer satisfies the following formula:

$$[Oi] \leqq 2.123 \times 10^{21} \exp(-1.035/k(T+273)),$$

where, said interstitial oxygen concentration is a value measured in accordance with FT-IR method (ASTM F-121, 1979) and the k is the Boltzmann's constant, 8.617×10^{-5}(eV/K).

8. A manufacturing method of a SOI wafer in accordance with claim 7, in which said active layer side silicon wafer is fabricated by using a silicon single crystal doped with phosphorus by neutron

irradiation.

9. A manufacturing method of a SOI wafer in accordance with claim 8, in which said active layer side silicon wafer is fabricated by using a silicon single crystal doped with nitrogen by a concentration of 2×10^{13} atoms/cm^3 of more.

10. A manufacturing method of a SOI wafer in accordance with any one of claim 7 through 9, in which said active layer side silicon wafer is fabricated by using a silicon single crystal doped with carbon by a concentration of 5×10^{16} atoms/cm^3 or more.

11. A manufacturing method of a SOI wafer, in which an active layer side silicon wafer is bonded to a supporting side wafer with an insulating film interposed therebetween and then a heat treatment for enhancing a bonding strength is applied to thus bonded wafer in an oxidizing atmosphere to thereby manufacture a bonded SOI wafer, wherein

assuming that a temperature at which said heat treatment for enhancing the bonding strength is carried out in said oxidizing atmosphere is denoted as T(℃) and an interstitial oxygen concentration of said active layer side silicon wafer is denoted as [Oi] (atoms/cm^3), said manufacturing method of the SOI wafer characterized in that a relation between said temperature T and said interstitial oxygen concentration [Oi] satisfies the following formula:

$$[Oi]\leqq 2.123\times10^{21}\exp(-1.035/k(T+273)),$$

where, said interstitial oxygen concentration is a value measured in accordance with FT-IR method (ASTM F-121, 1979) and the k is the Boltzmann's constant, 8.617×10^{-5}(eV/K).

12. A manufacturing method of a SOI wafer in accordance with claim 11, in which said active layer side silicon wafer is fabricated by using a silicon single crystal doped with phosphorus by neutron irradiation.

13. A manufacturing method of a SOI wafer in accordance with claim 11 or 12, in which said active layer side silicon wafer is fabricated by using a silicon single crystal doped with nitrogen by a concentration of 2×10^{13} atoms/cm^3 or more.

14. A manufacturing method of a SOI wafer in accordance with any one of claim 11 through 13, in which said active layer side silicon wafer is fabricated by using a silicon single crystal doped with carbon by a concentration of 5×10^{16} atoms/cm^3 or more.

15. A manufacturing method of a SOI wafer, comprising the steps of:

fabricating an active layer side silicon wafer by firstly applying an oxidizing heat treatment to a silicon wafer, which satisfies the following formula representing a relation between a heat treatment temperature T and an interstitial oxygen concentration [Oi]:

$$[Oi] \leqq 2.123\times10^{21}\exp(-1.035/k(T+273)),$$

where, T(℃) is the temperature at which said heat treatment is carried out in an oxidizing atmosphere, and [Oi] (atoms/cm^3) is the interstitial oxygen concentration in the silicon wafer, wherein said interstitial oxygen concentration is a value measured in accordance with FT-IR method (ASTM F-121, 1979) and the k is the Boltzmann's constant, 8.617×10^{-5}(eV/K), and by secondly removing an oxide film and applying a mirror-polishing;

forming an ion implanted layer in said active layer side silicon

wafer by forming an oxide film on said active layer side silicon wafer, and ion-implanting via said oxide film;

subsequently, forming a bonded wafer by bonding said active layer side silicon wafer to a supporting side wafer with said oxide film interposed therebetween; and

then, separating a part of said active layer side silicon wafer from a boundary defined by said ion implanted layer by holding said bonded wafer at a predetermined temperature to thereby apply a heat treatment thereto.

16. A manufacturing method of a SOI wafer in accordance with claim 15, in which a surface of the separated active layer side wafer is mirror-polished so that it can be used repeatedly as a substrate for forming a new active layer of the SOI wafer.

17. A manufacturing method of a SOI wafer in accordance with claim 15 or 16, in which said active layer side silicon wafer is fabricated by using a silicon single crystal doped with phosphorus by neutron irradiation.

18. A manufacturing method of a SOI wafer in accordance with any one of claim 15 through 17, in which said active layer side silicon wafer is fabricated by using a silicon single crystal doped with nitrogen by a concentration of 2×10^{13} atoms/cm^3 or more.

19. A manufacturing method of a SOI wafer in accordance with any one of claim 15 through 18, in which said active layer side silicon wafer is fabricated by using a silicon single crystal doped with carbon by a concentration of 5×10^{16} atoms/cm^3 or more.